## APPENDIX B

**Stormwater Management Calculations** 

PROJECT NAME:	Preliminary S	Stormwater Mar	nagement Con	nputations	Computed By:	GK
		ad - New Castle			Date:	A SERVICE AND A
					Checked By:	
					Date:	
	STUDY	POINT: 1				
Hydrologic Computations :						
		Existing	Proposed			
	nage Area (ac)		9.86			
	vious Area (ac)		3.49			
Percent imp	pervious Cover	: 61.14	35.40			
Added Imperv	ious Area (ac)	:	1.35			
Present Condition :		ADEA (A)				
	doug Area (as)	AREA, (A)	CN	AxCN		
Assumed B Soil Open Ar	vious Area (ac)		98	209.72		
	nage Area (ac)		61	470.92	+1100 ( 5	
	nage Area (sm)			680.64	* Ultimate Dr	ainage are
CN (Weighted) =			CN	= 69.0		
		ADEA (A)				
Developed Condition :	doug Ares (se)	AREA, (A)	CN	AxCN		
Imper	vious Area (ac)	3.49	98	342.02		
Assumed B Soil Open Ar	ea (Good) (ac)	6.37	61	388.57		
Iotal Drail	nage Area (ac)	9.86		730.59		
CN (Weighted) =	(A x CN) / (A)	:	CN	= 74.1		
Time of Concentration (Tc):		(Ditch Flow)				
		Surface :		Unpaved		
	F	low Length, (ft):		4400		
	* ^	Slope (ft/ft):		0.0061		
	Average v	/elocity, V (ft/s):		4.00		* Assumed
Storage Volume For Detention	n Basin : 10 Ve	ar Managomon	Tc (hr)	0.306	N. C.	7
			<u> </u>			
Vs = Storage Volume (ac-ft)		?		Co = Coeffici	ent =	0.682
Vr = Runoff Volume (ac-ft)	=	2.0130		C1 = Coeffici		-1.43
Qo = Peak Outfloe Discharge		22		C2 = Coeffici		1.64
Qi = Peak Inflow Discharge (c	fs) =	27		C3 = Coeffici	ent =	-0.804
	Vs / Vr = Co	+ C1 (Qo/Qi) + C	22 (Qo/Qi)^2 +	C3 (Oo/Oi)^3		1
		0. (40,4.)	(40/4/) 2 -	Q (in) =	2.45	
	Vs/Vr =	0.1707		Where Vr = (5		2.0130
		0		1111010 11 - (0	0.00)(Q)(AIII)	2.0130
	Vs =		ac-ft =	14968	cf	
Storage Volume For Detention	n Basin : Water	Quality Manag	ement	20		
		quality manag	CHICHE	F		
Additional Imper			<u>ement</u>	F		
Additional Impen	vious Area (ac):	1.35		8.		1
Runoff Volume	vious Area (ac): e Required (in):	1.35 1.00				10 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
Additional Imper Runoff Volume Required Storage	vious Area (ac): e Required (in):	1.35				
Runoff Volume	vious Area (ac): e Required (in): Volume (ac-ft):	1.35 1.00 <b>0.11</b>	<u> </u>	(Water Quality	and Quantity Vo	olume)
Runoff Volume Required Storage	vious Area (ac): e Required (in): Volume (ac-ft):	1.35 1.00		(Water Quality	and Quantity Vo	olume)
Runoff Volume Required Storage  Total Storage Volume Re Total Storage Volume	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf):	1.35 1.00 <b>0.11</b>	20 7 20 7 20 7 20 7 20 7 20 7 20 7 20 7	(Water Quality	and Quantity Vo	olume)
Runoff Volume Required Storage  Total Storage Volume Re Total Storage Volume  Preliminary Detention Basin S	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf):	1.35 1.00 0.11 0.46 19869				olume)
Runoff Volume Required Storage Total Storage Volume Re Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft):	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): izing 3.00	1.35 1.00 0.11 0.46 19869		(Water Quality		olume)
Runoff Volume Required Storage  Total Storage Volume Re Total Storage Volume  Preliminary Detention Basin S	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf):	1.35 1.00 0.11 0.46 19869				olume)
Runoff Volume Required Storage Total Storage Volume Re Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft):	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): izing 3.00	1.35 1.00 0.11 0.46 19869				olume)
Runoff Volume Required Storage  Total Storage Volume Re Total Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft): Assumed Facility Width (ft):  Facility Area Required (ac):	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00 50.00	1.35 1.00 0.11 0.46 19869	Assumed Faci			olume)
Runoff Volume Required Storage  Total Storage Volume Re Total Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft): Assumed Facility Width (ft):  Facility Area Required (ac):	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00 50.00	1.35 1.00 0.11 0.46 19869				olume)
Runoff Volume Required Storage  Total Storage Volume Re Total Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft): Assumed Facility Width (ft):  Facility Area Required (ac):	vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00 50.00	1.35 1.00 0.11 0.46 19869	Assumed Faci 19950 DAD	lity Length (ft) :		olume)

PROJECT NAME:		ormwater Man			Computed By:	GK
	Choptank Roa	d - New Castle	County, Dela	ware.	Date:	04/18/02
					Checked By:	
					Date:	
Hadaalaala Oana tati	STUDY	POINT: 2	5			
Hydrologic Computations		Foliation				
Total Desi	A ()	Existing	Proposed			
	nage Area (ac):	4.94	13.04			
	vious Area (ac):	2.98	4.95			
Percent imp	pervious Cover :	60.32	37.96			
Added Impen	vious Area (ac) :		1.97			
Present Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac) :	2.98	98	292.04		
Assumed B Soil Open Ar	ea (Good) (ac)	10.06	61	613.66	1	
	nage Area (ac):	13.04	01	905.7	* I Iltimate	Drainage are
	lage Area (sm):	0.02038		903.1	Utilliate	Diamage are
CN (Weighted) =			CN :	69.5		
Developed Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac) :	4.95	98	485.1		
Assumed B Soil Open Are		8.09	61	493.49		
	nage Area (ac):	13.04		978.59		
	J			3,0.00		
CN (Weighted) =	(A x CN) / (A) :		CN =	75.0		
Time of Concentration (Tc):	(Shallo	w Concentrate	d Flow)		* Assi	umed ditch flo
		Surface :		Unpaved		arrow arrow mo
	Flo	ow Length, (ft):		5900		
		Slope (ft/ft):		0.0046		
	* Average Ve	elocity, V (ft/s):		4.00		* Assume
Storage Volume For Detention	n Basin : 10 Yea	ır Management	Tc (hr) =	0.410		
Vs = Storage Volume (ac-ft)	n Basin : 10 Yea	ır Management	Tc (hr) =	ís e e e e e e e e e e e e e e e e e e e		0.682
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft)	=	r Management 2.7491	Tc (hr) =	0.410  Co = Coefficie C1 = Coefficie	ent =	7.
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (	= (cfs) =		Tc (hr) =	Co = Coefficie	ent =	0.682
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (	= (cfs) =	2.7491	Tc (hr) =	Co = Coefficie	ent = ent =	0.682 -1.43
/s = Storage Volume (ac-ft) /r = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge ( Qi = Peak Inflow Discharge (c	= (cfs) = fs) =	2.7491 25 31	reconstruction of the control of the	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie	ent = ent =	0.682 -1.43 1.64
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (Qi = Peak Inflow Discharge (c	= (cfs) =	2.7491 25 31	reconstruction of the control of the	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3	ent = ent = ent =	0.682 -1.43 1.64
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (Qi = Peak Inflow Discharge (c	= (cfs) = fs) = Vs / Vr = Co+	2.7491 25 31 C1 (Qo/Qi) + C	reconstruction of the control of the	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = ent = 2.53	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (Qi = Peak Inflow Discharge (c	= (cfs) = fs) =	2.7491 25 31	reconstruction of the control of the	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent =	0.682 -1.43 1.64
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (Qi = Peak Inflow Discharge (c	= (cfs) = fs) = Vs / Vr = Co +	2.7491 25 31 C1 (Qo/Qi) + C	reconstruction of the control of the	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (Qi = Peak Inflow Discharge (C	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs =	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = ent = 2.53	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Imperv	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = D Basin : Water	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Imperv	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = D Basin : Water	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervention	= (cfs) = (fs) = (vs / Vr = Co + (vs / Vr = (vs - vious Area (ac): (e Required (in): (vs - vious Area (in): (vs -	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) =	0.682 -1.43 1.64 -0.804
Storage Volume For Detention  Additional Imperv	= (cfs) = (fs) = (vs / Vr = Co + (vs / Vr = (vs - vious Area (ac): (e Required (in): (vs - vious Area (in): (vs -	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervention Required Storage	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = Basin : Water vious Area (ac): e Required (in): Volume (ac-ft):	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) = cf	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervention	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = Description Area (ac): Required (in): Volume (ac-ft): Pequired (ac-ft):	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Retailed Storage Volume	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water vious Area (ac): e Required (in): Volume (ac-ft): Required (cf):	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16	2 (Qo/Qi)^2 + ac-ft =	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) = cf	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Retail Total Storage Volume  Preliminary Detention Basin S	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water vious Area (ac): e Required (in): Volume (ac-ft): Required (cf):	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16 0.64 27950	2 (Qo/Qi)^2 + ac-ft = ement	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5) 20799  (Water Quality	ent =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Retention Storage Volume  Preliminary Detention Basin Storage Facility Depth (ft):	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water vious Area (ac): e Required (in): Volume (ac-ft): Required (cf): sizing	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16 0.64 27950	2 (Qo/Qi)^2 + ac-ft = ement	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5)	ent = ent = ent = ent = 2.53 3.33)(Q)(Am) = cf	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Retention Storage Volume  Preliminary Detention Basin Storage Facility Depth (ft):	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = D Basin : Water vious Area (ac): Required (in): Volume (ac-ft): Required (cf): Sizing 3.00	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16 0.64 27950	2 (Qo/Qi)^2 + ac-ft = ement	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5) 20799  (Water Quality	ent =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Reternal Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft): Assumed Facility Width (ft):  Facility Area Required (ac):	= (cfs) = fs) = Vs / Vr = Co + Vs / Vr = Vs = D Basin : Water vious Area (ac): Required (in): Volume (ac-ft): Required (cf): Sizing 3.00 60.00	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16 0.64 27950	2 (Qo/Qi)^2 + ac-ft = ement	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5) 20799  (Water Quality	ent =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (c) Qi = Peak Inflow Discharge (c)  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Reteroital Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft): Assumed Facility Width (ft):  Facility Area Required (ac):	corage Volume F	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16 0.64 27950	ac-ft = ement  Assumed Facil	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5) 20799  (Water Quality	ent =	0.682 -1.43 1.64 -0.804
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge (Qi = Peak Inflow Discharge (compared to the peak Inflow Discharge Volume Required Storage Volume Preliminary Detention Basin Storage Volume Facility Depth (ft):  Assumed Facility Depth (ft): Facility Area Required (ac):	= (cfs) = fs) = Ts / Vs / Vr = Co + Vs / Vr = Vs = Ts / Vs / Vr = Vs = Ts / Vs / Vr = Vs / Vs = Ts / Vs / Vr = Vs Vs /	2.7491 25 31 C1 (Qo/Qi) + C 0.1737 0.4775 Quality Manage 1.97 1.00 0.16 0.64 27950	ac-ft = ement  Assumed Facil 27900	Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (5) 20799  (Water Quality	ent =	0.682 -1.43 1.64 -0.804

	I Tellillillary 3	ormwater Mana	agement Con	nputations	Computed By:	GK
	Choptank Roa	d - New Castle	County, Dela	ware.	Date:	
					Checked By:	
					Date:	
	STUDY POI	NT: 3 AND 4				
Hydrologic Computations						
		Existing	Proposed			
I otal Drai	inage Area (ac):	4.13	11.24			
Imper	vious Area (ac):		3.94			
Percent Imp	pervious Cover:	57.14	35.05			
	<u> </u>					
Added Imper	vious Area (ac):		1.58			
Present Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac) :	2.36	98	231.28		
Assumed B Soil Open Ar	rea (Good) (ac) :	8.88	61	541.68		
	nage Area (ac):	11.24	01	772.96	* I litimate	Desires
* Total Drain	nage Area (sm):	0.01756		112.90	Ultimate	Drainage are
CN (Weighted) =	= (A x CN) / (A) ·	0.01130	CN	= 68.8		
ora (trongintou)	VIX ON TOUR		January City	- 00.0	ă .	
Developed Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac) :	3.94	98	386.12		
Assumed B Soil Open Ar		7.30	61	445.3		
Total Drain	nage Area (ac):	11.24	UI	831.42	1	
Total Brain	riago Arca (ac) .	11.23		031.42		
CN (Weighted) =	(A x CN) / (A) :		CN	<b>=</b> 74.0		
Time of Concentration (Tc):	(Shallo	w Concentrated	Flow)		* Assı	med ditch flo
		Surface :		Unpaved	7.000	arriod ditori no
	Flo	ow Length, (ft):		3700		
		Slope (ft/ft):		0.0019		
	* Average Ve	elocity, V (ft/s):		4.00		* Assume
						7.10001110
			Tc (hr)	= 0.257		
Storage Volume For Detention	n Basin : 10 Yea	r Management				1
Vs = Storage Volume (ac-ft)		2		C C (C-:	-4	0.000
Vs = Storage Volume (ac-ft)	_	?		Co = Coefficie		0.682
Vr = Runoff Volume (ac-ft)	= (cfs) =	2.2853		C1 = Coefficie	ent =	-1.43
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge	(cfs) =	2.2853 27		C1 = Coefficie C2 = Coefficie	ent =	-1.43 1.64
Vr = Runoff Volume (ac-ft)	(cfs) =	2.2853		C1 = Coefficie	ent =	-1.43
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = :fs) =	2.2853 27 33	2 (00/0:)\\\ 2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie	ent =	-1.43 1.64
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =	2.2853 27 33	2 (Qo/Qi)^2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3	ent = ent = ent =	-1.43 1.64
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = (fs) = Vs / Vr = Co +	2.2853 27 33 C1 (Qo/Qi) + C2	2 (Qo/Qi)^2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = 2.44	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = :fs) =	2.2853 27 33	2 (Qo/Qi)^2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent =	-1.43 1.64
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = (fs) = Vs / Vr = Co + Vs / Vr =	2.2853 27 33 <b>C1 (Qo/Qi) + C2</b> 0.1695		C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =   (fs) =   Vs/Vr = Co +   Vs/Vr =   Vs =	2.2853 27 33 <b>C1 (Qo/Qi) + C2</b> 0.1695 0.3873	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = 2.44	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =   (fs) =   Vs/Vr = Co +   Vs/Vr =   Vs =	2.2853 27 33 <b>C1 (Qo/Qi) + C2</b> 0.1695 0.3873	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Imperior	(cfs) =	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Imperation Required Storage	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft):	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Imperation Required Storage  Total Storage Volume Re	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft):  equired (ac-ft):	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) =	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Imperation Required Storage	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft):  equired (ac-ft):	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Re  Total Storage Volume	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Re  Total Storage Volume	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Retail Storage Volume  Preliminary Detention Basin S	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Impervent Runoff Volume Required Storage  Total Storage Volume Reternal Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft):	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Storage Volume For Detention  Additional Impervention Runoff Volume Required Storage  Total Storage Volume Re	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c  Storage Volume For Detention  Additional Impervation Required Storage  Total Storage Volume Retail Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft):	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous periodic	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge Volume Required Storage Volume Preliminary Detention Basin Storage Volume Regulated Prel	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): Required (cf):  Sizing  3.00  55.00  0.17	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge Volume Required Storage Volume Preliminary Detention Basin Storage Volume Regulated Prel	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Name	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (compared to the peak Inflow Discharge Volume Required Storage Volume Preliminary Detention Basin Storage Volume Facility Depth (ft):  Facility Area Required (ac):	(cfs) =  Ifs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): Required (cf):  Sizing  3.00  55.00  0.17  Forage Volume P	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment ssumed Facil	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873 (Water Quality a)	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge Volume Required Storage Volume Preliminary Detention Basin Storage Volume Regulation Basin Storage Volume Preliminary Detention Basin Storage Volume Regulation Basin Basin Basin Basin Basi	(cfs) = (cfs)	2.2853 27 33 C1 (Qo/Qi) + C2 0.1695 0.3873 Quality Manage 1.58 1.00 0.13 0.52 22608	ac-ft = ment ssumed Facil 23100	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 16873  (Water Quality a	ent = ent = ent = 2.44 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 2.2853

PROJECT NAME:	Preliminary St				Computed By:	GK
	Choptank Roa	d - New Castle	County, Dela	ware.	Date:	04/18/02
					Checked By:	
					Date:	
	STUDY POI	NT: 5 AND 6				
Hydrologic Computations						
		Existing	Proposed		- Y-12	
	inage Area (ac):		4.21			
Imper	vious Area (ac):	0.86	1.51			
Percent Im	pervious Cover:	60.99	35.87			
Added Imper	vious Area (ac):		0.65			
Description of Constitution	6	ADEA (A)	CNI			
Present Condition		AREA, (A)	CN	AxCN		
Imper	vious Area (ac):	0.86	98	84.28		
Assumed B Soil Open A		3.35	61	204.35		
	nage Area (ac):	4.21		288.63	* Ultimate	e Drainage are
	nage Area (sm):	0.00658				
CN (Weighted) =	= (A x CN) / (A) :		CN	= 68.6		
Developed Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac):	1.51	98	147.98		
Assumed B Soil Open Ar		2.70	61	164.7		
	nage Area (ac):	4.21	01	312.68		
Total Dial	lago / iroa (ao) .	J L	4	312.00		
CN (Weighted) =	(A x CN) / (A) :		CN	= 74.3		
Time of Concentration (Tc):	(Shallo	w Concentrate	d Flam)		* ^	
Time of Concentration (10).	Jonano			<del> </del>	* Ass	umed ditch flov
		Surface :		Unpaved		
	FIG	ow Length, (ft):		1200		
	+ 4	Slope (ft/ft):		0.0225		
	* Average Ve	elocity, V (ft/s):		4.00		* Assume
			Tc :	= 0.08		
			Use Tc (hr)	= 0.100		
Storage Volume For Detentio	n Basin : 10 Yea	r Managemen		1		
Vs = Storage Volume (ac-ft)		?		Co = Coefficie	ent =	0.682
Vr = Runoff Volume (ac-ft)	=	0.8665		C1 = Coefficie		-1.43
Qo = Peak Outfloe Discharge	(cfs) =	12		C2 = Coefficie		1.64
Qi = Peak Inflow Discharge (c	rfs) =	15		C3 = Coefficie		-0.804
	Vs / Vr = Co +	C1 (Qo/Qi) + 0	2 (Qo/Qi)^2 +	The same of the sa		
	V (V	0.4700		Q (in) =		
	Vs/Vr =	0.1760		Where Vr = (5	3.33)(Q)(Am) =	0.8665
	Vs =	0.1525	ac-ft =	6641	cf	
Storage Volume For Detention	n Basin : Water			0041	Ci	
			(1) - 10 - 10 - 10 - 10 - 10 - 10 - 10 -			
Additional Imper		0.00				
Runoff Volum	e Required (in):	1.00				
D : 101	\/aluma (aa ft).	0.00				
Required Storage	volume (ac-it).					
Required Storage	volume (ac-it):					
Total Storage Volume Re		0.15		(Water Quality	and Quantity Vol	ume)
	equired (ac-ft):	0.15 6641		(Water Quality	and Quantity Vol	ume)
Total Storage Volume Ro Total Storage Volume	equired (ac-ft): Required (cf):		120 8 3 7 2 3 11 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(Water Quality	and Quantity Vol	ume)
Total Storage Volume Ro Total Storage Volume	equired (ac-ft): Required (cf):			(Water Quality	and Quantity Vol	ume)
Total Storage Volume Ro Total Storage Volume Preliminary Detention Basin S	equired (ac-ft): Required (cf):	6641	Assumed Facil			ume)
Total Storage Volume Ro Total Storage Volume	equired (ac-ft): Required (cf):	6641	Assumed Facil	(Water Quality	and Quantity Vol	ume)
Total Storage Volume Ro Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft) : Assumed Facility Width (ft) :	equired (ac-ft): Required (cf): Sizing  3.00 35.00	6641	Assumed Facil			ume)
Total Storage Volume Ro Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft):	equired (ac-ft): Required (cf): Sizing 3.00	6641	Assumed Facil			ume)
Total Storage Volume Ro Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft) : Assumed Facility Width (ft) : Facility Area Required (ac):	equired (ac-ft): Required (cf): Sizing 3.00 35.00 0.05	6641				ume)
Total Storage Volume Ro Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft) : Assumed Facility Width (ft) : Facility Area Required (ac):	equired (ac-ft): Required (cf): Sizing  3.00 35.00	6641	Assumed Facil			ume)
Total Storage Volume Ro Total Storage Volume Preliminary Detention Basin S Assumed Facility Depth (ft) : Assumed Facility Width (ft) : Facility Area Required (ac):	equired (ac-ft): Required (cf): Sizing  3.00 35.00  0.05  torage Volume F	6641	6825			ume)

■ No. 1 to 1	Freininary St	ormwater Man	agement Com	putations	Computed By:	GK
	Choptank Roa				Date:	04/18/02
					Checked By:	
					Date:	
	STUDY POI	NT: 7 AND 8				
Hydrologic Computations						
		Existing	Proposed			
Total Drai	inage Area (ac):	2.09	5.96			
Imper	vious Area (ac):	1.26	2.16			
	pervious Cover:	60.29	36.24			
Added Imper	vious Area (ac):		0.90			
Present Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac):	1.26	98	123.48		
Assumed B Soil Open Ar		4.70	61	286.7		
	nage Area (ac) :	5.96		410.18	* Ultimate	Drainage are
* Total Drain	nage Area (sm) :	0.00931				
CN (Weighted) =	= (A x CN) / (A) :		CN:	= 68.8		
Developed Condition :	7	ADEA (A)	CN	A C11		
		AREA, (A)	CN	AxCN		
Impen	vious Area (ac):	2.16	98	211.68		
Assumed B Soil Open Ar		3.80	61	231.8		
I otal Drai	nage Area (ac):	5.96		443.48		
ONL DATE TO THE	- (4 01) ( (1)			**************************************		
CN (Weighted) =	= (A x CN) / (A) :		CN =	74.4		
Time of Concentration (Tc) :	(Shallov	w Concentrated	d Elow)		* ^	
Time of concentration (1c).	Jonano	Surface :	a riow)	Llanauad	ASSL	umed ditch flo
	Ele			Unpaved		
	FIC	ow Length, (ft):		1550		
	* ^	Slope (ft/ft):		0.0013		
	" Average ve	elocity, V (ft/s):		4.00		* Assume
			T- (1-4)	0.400		
Storage Volume For Detention	n Basin : 10 Voa	r Managamant	Tc (hr) =	0.108		
eterage volume for Beternion	i Dasii . 10 lea	i Management				
/s = Storage Volume (ac-ft)		2		Co - Coofficia	m+ -	0.000
		?		Co = Coefficie		0.682
/r = Runoff Volume (ac-ft)	= (cfs) =	1.2317		C1 = Coefficie	ent =	-1.43
/r = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge	(cfs) =	1.2317 17		C1 = Coefficie	ent =	-1.43 1.64
/r = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge	(cfs) =	1.2317		C1 = Coefficie	ent =	-1.43
/r = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = cfs) =	1.2317 17 22	2 (00/0)\\2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie	ent =	-1.43 1.64
/r = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =	1.2317 17 22	2 (Qo/Qi)^2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3	ent = ent = ent =	-1.43 1.64
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = cfs) = Vs / Vr = Co +	1.2317 17 22 C1 (Qo/Qi) + C	2 (Qo/Qi)^2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = 2.48	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = cfs) =	1.2317 17 22	2 (Qo/Qi)^2 +	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3	ent = ent = ent = 2.48	-1.43 1.64
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853		C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (50)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr = Vs = Vs =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = 2.48	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr = Vs = Vs =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (50)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	(cfs) =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (50)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Impen	(cfs) =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (50)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior	(cfs) =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (50)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Impen	(cfs) =	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (50)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge)  Storage Volume For Detention  Additional Imperior Runoff Volume Required Storage	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Note: Note	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior Runoff Volume Required Storage  Total Storage Volume Re	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft):	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.48 3.33)(Q)(Am) =	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge)  Storage Volume For Detention  Additional Imperior Runoff Volume Required Storage	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft):	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge)  Storage Volume For Detention  Additional Imperious Required Storage  Total Storage Volume Retailed Storage Volume  Total Storage Volume	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Note: Note	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge)  Storage Volume For Detention  Additional Imperious Required Storage  Total Storage Volume Retailed Storage Volume  Total Storage Volume	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Note: Note	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Additional Impension Runoff Volume Required Storage  Total Storage Volume Regularity Total Storage Volume  Preliminary Detention Basin S	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf):	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior  Runoff Volume  Required Storage  Total Storage Volume  Preliminary Detention Basin S  Assumed Facility Depth (ft):	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53)	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continued on the peak Inflow Discharge (con	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf):	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior  Runoff Volume  Required Storage  Total Storage Volume Reternate Total Storage Volume  Preliminary Detention Basin Storage Volume  Assumed Facility Depth (ft):  Assumed Facility Width (ft):	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00 40.00	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continuous peak Inflow Discharge)  Storage Volume For Detention  Additional Imperious Required Storage  Total Storage Volume Retail Storage Volume  Total Storage Volume	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior  Runoff Volume Required Storage  Total Storage Volume Retention  Preliminary Detention Basin Storage Volume  Assumed Facility Depth (ft):  Assumed Facility Width (ft):  Facility Area Required (ac):	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): Required (cf): Sizing  3.00  40.00  0.10	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft = ement	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior  Runoff Volume Required Storage  Total Storage Volume Retention  Preliminary Detention Basin Storage Volume  Assumed Facility Depth (ft):  Assumed Facility Width (ft):  Facility Area Required (ac):	(cfs) = cfs) = Vs / Vr = Co + Vs / Vr = Vs = n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing 3.00 40.00	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft =	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (continue)  Storage Volume For Detention  Additional Imperior  Runoff Volume Required Storage  Total Storage Volume Retention  Preliminary Detention Basin Storage Volume  Assumed Facility Depth (ft):  Assumed Facility Width (ft):  Facility Area Required (ac):	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Note the second of the	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft = ement  ssumed Facil	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317
Area Required (ac):  Area Runoff Volume (ac-ft)  Peak Outfloe Discharge (continue)  Additional Imperous Runoff Volume Required Storage  Total Storage Volume Reservation Basin Storage Volume  Preliminary Detention Basin Storage Facility Area Required (ac):	(cfs) =  cfs) =  Vs / Vr = Co +  Vs / Vr =  Vs =  Note the second of the	1.2317 17 22 C1 (Qo/Qi) + C 0.1853 0.2282 Quality Manage 0.90 1.00 0.08 0.30 13208	ac-ft = ement  ssumed Facil  13200	C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) = Where Vr = (53) 9941  (Water Quality a	ent = ent = ent = 2.48 3.33)(Q)(Am) = cf	-1.43 1.64 -0.804 1.2317

[1985] 이 나는 아무리 아이들이 나가 있는데 아들이 아들아 아들이 아들아 아들아 아들아 아들아 아들아 아들아 아들아	Preliminary St				Computed By:	GK
	Choptank Roa	d - New Castle	County, Delay	ware.	Date:	
					Checked By:	
	OTHER VEGE	T 0 4ND 40			Date:	
Hydrologia Computations	STUDY POIN	1: 9 AND 10				
Hydrologic Computations		Existing	Proposed			-
Total Drai	inage Area (ac) :	0.89	2.59			
	vious Area (ac):	0.56	0.91			
	pervious Cover :	62.92	35.14			
		02.02	00.77			
Added Imper	vious Area (ac):		0.35			
Present Condition :	=	AREA, (A)	CN	A w CN		
	vious Area (ac) :	0.56	98	<b>A x CN</b> 54.88		
Assumed B Soil Open Ar		2.03	61	123.83		
	nage Area (ac):	2.59	01	178.71	* Ultimate	Drainage are
	nage Area (sm):	0.00405			Oldinate	Dramage are
CN (Weighted) =			CN =	69.0		
Developed Condition :	8	ADEA (A)	CN	A w CN		
	vious Area (ac) :	<b>AREA, (A)</b> 0.91	<b>CN</b> 98	<b>A x CN</b> 89.18		
Assumed B Soil Open Ar	ea (Good) (ac)	1.68	61	102.48	1	
	nage Area (ac):	2.59	UI	191.66		
Total Dia	nago / iroa (ao) .	2.00		131.00		
CN (Weighted) =	(A x CN) / (A) :		CN =	74.0		
Time of Concentration (Tc):	(Challet	w Concentrate	d [[])			
Time of Concentration (10).	Jonanov	Surface :	d Flow)	Unpaved	^ Assu	umed ditch flov
	Fic	ow Length, (ft):		1000		
	1	Slope (ft/ft):		0.0150		
	* Average Ve	elocity, V (ft/s):		4.00		* Assume
		, (/		1.00		Assume
			Tc (hr) =	0.07		
Storage Volume For Detention	n Basin : 10 Yea	r Management				
Vs = Storage Volume (ac-ft)		?		Co = Coefficie	ent =	0.682
Vr = Runoff Volume (ac-ft)	=	0.5266		C1 = Coefficie		-1.43
Qo = Peak Outfloe Discharge	(cfs) =	8		C2 = Coefficie		1.64
Qi = Peak Inflow Discharge (c	efs) =	9		C3 = Coefficie		-0.804
3.3.3.3.30 (0			2 (00/01) 42 +	C3 (Qo/Qi)^3		
	Vs/Vr = Co+	C1 (Qo/Qi) + C	2 (Q0/Q1) 2 T			
30 (0			2 (Q0/QI)*2 +	Q (in) =		
	Vs/Vr = Co+	C1 (Qo/Qi) + C 0.1420	2 (Q0/QI)"2 +	Q (in) =	2.44 3.33)(Q)(Am) =	0.5266
	Vs/Vr =	0.1420		Q (in) = Where Vr = (53	3.33)(Q)(Am) =	0.5266
	Vs/Vr =	0.1420 0.0748	ac-ft =	Q (in) =		0.5266
Storage Volume For Detention	Vs / Vr =  Vs =  Name = 1	0.1420 0.0748	ac-ft =	Q (in) = Where Vr = (53	3.33)(Q)(Am) =	0.5266
Storage Volume For Detention  Additional Imper	Vs / Vr =  Vs =  n Basin : Water (  vious Area (ac):	0.1420 0.0748	ac-ft =	Q (in) = Where Vr = (53	3.33)(Q)(Am) =	0.5266
Storage Volume For Detention  Additional Imperorum	Vs / Vr =  Vs =  n Basin : Water (  vious Area (ac): e Required (in):	0.1420 0.0748 Quality Manage	ac-ft =	Q (in) = Where Vr = (53	3.33)(Q)(Am) =	0.5266
Storage Volume For Detention  Additional Imper	Vs / Vr =  Vs =  n Basin : Water (  vious Area (ac): e Required (in):	0.1420 0.0748 Quality Manage 0.35	ac-ft =	Q (in) = Where Vr = (53	3.33)(Q)(Am) =	0.5266
Storage Volume For Detention  Additional Imperion Runoff Volum Required Storage	Vs / Vr =  Vs =  Note: N	0.1420 0.0748 Quality Manage 0.35 1.00 0.03	ac-ft =	Q (in) = Where Vr = (5: 3258	3.33)(Q)(Am) = cf	
Storage Volume For Detention  Additional Imperion Runoff Volum Required Storage  Total Storage Volume Re	Vs / Vr =  Vs =  Note: N	0.1420 0.0748 Quality Manage 0.35 1.00 0.03	ac-ft =	Q (in) = Where Vr = (5: 3258	3.33)(Q)(Am) =	
Storage Volume For Detention  Additional Imperion Runoff Volum Required Storage	Vs / Vr =  Vs =  Note: N	0.1420 0.0748 Quality Manage 0.35 1.00 0.03	ac-ft =	Q (in) = Where Vr = (5: 3258	3.33)(Q)(Am) = cf	
Storage Volume For Detention  Additional Imperounce Runoff Volum Required Storage  Total Storage Volume Re Total Storage Volume	Vs / Vr =  Vs =  Nous Area (ac): Required (in): Volume (ac-ft): Required (cf):	0.1420 0.0748 Quality Manage 0.35 1.00 0.03	ac-ft =	Q (in) = Where Vr = (5: 3258	3.33)(Q)(Am) = cf	
Storage Volume For Detention  Additional Imperson Runoff Volum Required Storage  Total Storage Volume Retail Storage Volume Retail Storage Volume  Preliminary Detention Basin S	Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf):	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement	Q (in) = Where Vr = (5: 3258  (Water Quality a	3.33)(Q)(Am) = cf	
Storage Volume For Detention  Additional Imperson Runoff Volum Required Storage  Total Storage Volume Retention Storage Volume  Preliminary Detention Basin Storage Facility Depth (ft):	Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing  3.00	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement	Q (in) = Where Vr = (5: 3258	3.33)(Q)(Am) = cf	
Storage Volume For Detention  Additional Imperson Runoff Volum Required Storage  Total Storage Volume Retail Storage Volume Retail Storage Volume  Preliminary Detention Basin Storage Volume	Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing  3.00	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement	Q (in) = Where Vr = (5: 3258  (Water Quality a	and Quantity Vol	
Additional Imperation Runoff Volum Required Storage  Total Storage Volume Retail Storage	Vs / Vr =  Vs =  Name of the second vious Area (ac):  Required (in):  Volume (ac-ft):  Required (cf):  Sizing  3.00  25.00	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement	Q (in) = Where Vr = (5: 3258  (Water Quality a	and Quantity Vol	
Storage Volume For Detention  Additional Imperson Runoff Volum Required Storage  Total Storage Volume Retention Storage Volume  Preliminary Detention Basin Storage Facility Depth (ft):	Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing  3.00	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement	Q (in) = Where Vr = (5: 3258  (Water Quality a	and Quantity Vol	
Additional Impersume Runoff Volume Required Storage  Total Storage Volume Retail Storage Volume  Preliminary Detention Basin Storage Volume Retaility Depth (ft):  Assumed Facility Width (ft):  Facility Area Required (ac):	Vs / Vr =  Vs =  Name of the second vious Area (ac):  Required (in):  Volume (ac-ft):  Required (cf):  Sizing  3.00  25.00	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement	Q (in) = Where Vr = (5: 3258  (Water Quality a	and Quantity Vol	
Additional Impersume Runoff Volum Required Storage  Total Storage Volume Retail Storage Volume  Preliminary Detention Basin Storage Volume Retaility Depth (ft): Assumed Facility Width (ft): Facility Area Required (ac):	Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing  3.00 25.00  0.03	0.1420 0.0748  Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement  Assumed Facil  4500	Q (in) = Where Vr = (5: 3258  (Water Quality a	and Quantity Vol	
Additional Impersume Runoff Volume Required Storage  Total Storage Volume Retail Storage Volume  Preliminary Detention Basin Storage Volume Retaility Depth (ft):  Assumed Facility Width (ft):  Facility Area Required (ac):	Vs / Vr =  Vs =  n Basin : Water (vious Area (ac): e Required (in): Volume (ac-ft): equired (ac-ft): Required (cf): Sizing  3.00 25.00  0.03	0.1420 0.0748 Quality Manage 0.35 1.00 0.03 0.10 4528	ac-ft = ement  Assumed Facil  4500	Q (in) = Where Vr = (5: 3258  (Water Quality a	and Quantity Vol	

PROJECT NAME:	<b>Preliminary St</b>	ormwater Mana	agement Com	putations	Computed By:	GK
		d - New Castle			Date:	04/18/02
	•		,		Checked By:	04/10/02
					Date:	
	STUDY POIN	T: 11 AND 12				
Hydrologic Computations						
		Existing	Proposed			
	nage Area (ac):	1.94	5.75			
	vious Area (ac):	1.40	2.05			
Percent Imp	pervious Cover :	72.16	35.65			
Added Imper	vious Area (ac) :		0.65			
Present Condition :	*	AREA, (A)	CN	A x CN		
	vious Area (ac) :	1.40	98	137.2		
Assumed B Soil Open Ar		4.35	61	265.35		
	nage Area (ac) :	5.75		402.55	* Ultimate	Drainage are
	nage Area (sm):	0.00898			Onmate	Diamage are
CN (Weighted) =			CN =	70.0		
Developed Condition :		AREA, (A)	CN	AxCN		
	vious Area (ac) :	2.05	98	200.9		
Assumed B Soil Open Ar		3.70	61	225.7		
I otal Draii	nage Area (ac) :	5.75		426.6		
CN (Weighted) =	(A × CN) / (A) :		CN =	74.0		
Civ (Weighted) -	(AXCIN)/(A).		CN -	74.2		
Time of Concentration (Tc):	(Shallov	w Concentrated	flow)		* Assı	med ditch flov
		Surface :		Unpaved	7.000	arriod ditorr nov
	Flo	ow Length, (ft):		1885		
		Slope (ft/ft):		0.0080		
	* Average Ve	elocity, V (ft/s):		4.00		* Assume
	Avelage ve	Flocity, V (108).				Assume
	Average ve					Assume
			Use Tc (hr) =			Assume
Storage Volume For Detention						Assume
		r Management		0.131		
Vs = Storage Volume (ac-ft)	n Basin : 10 Yea	r Management		0.131 Co = Coefficie	ent =	0.682
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft)	n Basin : 10 Yea	r Management ? 1.1787		Co = Coefficie C1 = Coefficie	ent =	0.682 -1.43
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge	Basin : 10 Yea = (cfs) =	? 1.1787 17		Co = Coefficie C1 = Coefficie C2 = Coefficie	ent = ent = ent =	0.682 -1.43 1.64
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge	Basin : 10 Yea = (cfs) =	r Management ? 1.1787		Co = Coefficie C1 = Coefficie	ent = ent = ent =	0.682 -1.43
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	= (cfs) = fs) =	? 1.1787 17 20		Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie	ent = ent = ent =	0.682 -1.43 1.64
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	Basin : 10 Yea = (cfs) =	? 1.1787 17 20		Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3	ent = ent = ent = ent =	0.682 -1.43 1.64
Vs = Storage Volume (ac-ft) Vr = Runoff Volume (ac-ft) Qo = Peak Outfloe Discharge Qi = Peak Inflow Discharge (c	= (cfs) = fs) =	? 1.1787 17 20		Co = Coefficie C1 = Coefficie C2 = Coefficie C3 = Coefficie C3 (Qo/Qi)^3 Q (in) =	ent = ent = ent = ent = 2.46	0.682 -1.43 1.64 -0.804
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### Carucci, Chris

From:

Altevogt, Jr. Charles A.

Sent:

Tuesday, April 16, 2002 8:46 AM

To:

Carucci, Chris

Subject:

FW: Stormwater Management for Choptank Road

----Original Message----

From: Kiegel, Rick [mailto:RJKiegel@MCCormickTaylor.com]

Sent: Monday, April 15, 2002 3:23 PM

To: Charles Altevogt (E-mail)

Cc: Blendy, Nick; Foglietta, Theodore

Subject: Stormwater Management for Choptank Road

#### Charles,

We have completed our stormwater management analysis and anticipate that this project will be eligible for a waiver of stormwater management quantity control in accordance with the Delaware Sediment and Stormwater Regulations.

Section 3, paragraph 2 B (1) of the Delaware Sediment and Stormwater Regulations states the following:

A project may be eligible for a waiver of stormwater management for quantity control if the applicant can demonstrate that (1) the proposed project will not generate an increase in the 2-year post development peak rate of more than ten (10) percent above the 2-year pre-development rate and will have no adverse impact on the receiving wetland, watercourse or waterway.

Our stormwater engineer has concluded that this project should fall under that criteria. Based on this, quantity control is not anticipated for this project. In terms of stormwater management quality control, we analyzed the outfalls and sized water quality basins to store the first inch of runoff from the additional impervious areas. These basins can all be sized to fit within the proposed right-of-way. No major outlet is needed either.

Based on this investigation, I don't anticipate any needs for additional right-of-way or increases in construction costs. Any work associated with these basins will be limited primarily to earthwork and a small outlet. Our construction estimate has generous multipliers for incidentals which will more than cover and costs associated with this activity.

If you have any questions, please call me. Thank you.

Rick J. Kiegel, P.E. McCormick, Taylor & Associates, Inc. 3600 Clipper Mill Road, Suite 350 Baltimore, MD 21211

(410) 662-7400 (410) 662-7401 fax rjkiegel@mccormicktaylor.com

# STATE OF DELAWARE DEPARTMENT OF TRANSPORTATION



To: Chris Carucci, Road Design

From: Charles Altevogt, Project Development/

Date: 26Apr02

Subject: Choptank Road Auxiliary Lanes

Regarding left turn lanes for residential subdivisions, a worse case scenario was checked for warrants in the design year. The largest subdivision is Back Creek. That segment of Choptank Road also has the largest volume of traffic. As the attached figure 7-12 from the Road Design Manual shows, neither AM nor PM peak hour conditions would meet warrants for a left turn. Therefore, it follows that the other smaller subdivisions, which also occur on segments of Choptank Road with lower traffic, would also not meet warrants.

Regarding right turn lanes, both Back Creek and Fox Hunter Crossing currently have them, and would meet warrants. However, in view of the following discussion for road intersections, consideration should be given to the traffic calming derived by eliminating the turn lanes. This is particularly for for Back Creek, since all southbound vehicles require deceleration only 400 feet away at the Churchtown Road intersection.

Regarding left turns at road intersections along Choptank Road, three locations, Bethel Church, Churchtown, and Bunker Hill are single lane roundabouts, and therefore would not have auxiliary lanes. For the other intersections, a worse case scenario was checked at Armstrong Corner Road. As the attached figure 7-12 shows, neither AM nor PM peak would meet warrants.

Regarding right turns, Armstrong Corner Road is estimated to have about 200 right turns per day with road ADT of about 2350. The road is posted at 45mph, design speed is 50 mph. Strict interpretation of Design Manual figure 7-14 would just meet warrants. However, given that the warrants are barely met, and there is no rear end crash history, three factors argue against a right turn lane at Armstrong Corner Road. Warrants would not be met at the lesser roads (Bohemia Mill and School House).



Speeding was a common issue raised during public meetings. Absence of a right turn lane will tend to slow traffic following decelerating right turners. Secondly, speed is related to the most significant public issue, i.e., that improvements to the road will increase traffic diversions from US 301, especially trucks. Traffic demand modeling indicates this route is sensitive to speed, and that significant diversions are likely in the absence of major improvements to the US 301 corridor. Thirdly, Choptank Road is part of Bicycle Route One. Auxilary lanes, even with the current standards of lane striping with additional pavement create more significant vehicle/ bike conflicts than a continuous shoulder bike lane.

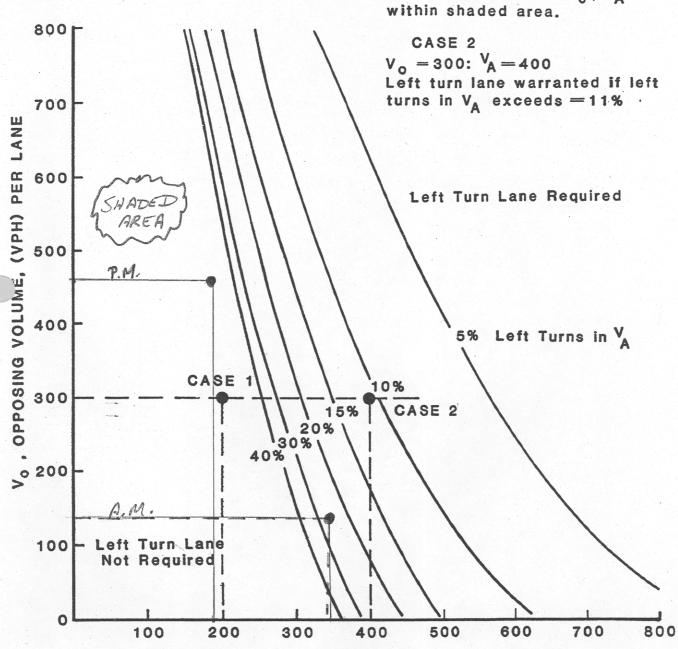
#### Figure 7-12

### VOLUME GUIDELINES FOR LEFT-TURN LANE





Left turn lanes not warranted for combinations of  $V_0 + V_A$  within shaded area.



VA , ADVANCING VOLUME, (VPH) PER LANE

P.M. - NOT WARRANTED

A.M. - 25% of VA = (25)(328) 7-28 LEFT TURNS = 4/328 = 01: NOT WARRANTED

FORD DESIGN MANUAL